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The incidence of neonatal developmental dysplasia of the hip in Arar, Saudi Arabia

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Abstract

Aim: In this study, it was aimedto investigate the incidence and risk factors of neonatal hip joint Developmental Dysplasia in Arar City. Material and Method: Hospital records of all newborns in both Arar Central Hospital and Prince Abdulaziz bin Musaad Hospital in Arar city from January 2013 to the end of December 2013 were reviewed with their follow-up files till December 2015. Records include a detailed history, careful physical examination, results of the laboratory and radiological investigations. Results: The records of 2582 newborns were reviewed. The incidence of DDH was estimated to be 6.19/1000 live births. Ten cases (62.5 %) were females with estimated male to female ratio equal to 1:2.6. Spontaneous vaginal delivery occurred in 11 cases (68.75%), a caesarean section in 5 cases (31.25%). Limping and waddling gait was the most common finding in 10 cases (62.5%). DDH was significantly associated with primiparity, low birth weight, prematurity and positive family history of DDH (p-values=0.0009, 0.014, 0.038, and 0.0006 respectively). Discussion: Screening of DDH in Arar City of Northern Border province of Saudi Arabia was estimated to be 6.19/ 1000 live births. Awareness programs, routine examination of the neonatal hip joint with the hip ultrasound and pelvis plain x-ray in babies with risk factors for DDH are strongly recommended.

Keywords

Developmental Dysplasia; Hip; Infant; Newborn; Arar Region; Saudi Arabia

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Introduction

Developmental dysplasia of the hip (DDH) is a common neonatal abnormality which was formerly named as congenital dislocation of the hip [1]. Till now, the definition of DDH is indefinite and obscure in literature with much more conflict about its incidence within the different studied populations [2,3] . It includes a group of hip disorders as hip instability, dysplasia, subluxation, or dislocation. The term also encompasses an array of radiographic abnormalities that reflect the inadequate formation of the acetabulum. The etiology of DDH is multifactorial. It is associated with family history and other hormonal and environmental factors [4].

DDH occurs in 11.5 of 1,000 infants, with frank dislocations occurring in 1 to 1.5 of 1,000 [1,2]. Before the 1980s, the incidence of DDH was estimated to range from zero to 40% [5]. While after the introduction of the routine screening program in the 1980s, the reported incidence had increased up to 52% [5-7]. This wide variation in numbers was mainly due to indefinite definition and screening and diagnostic protocols.

Screening for DDH is a part of the newborn routine physical examination. DDH screening is mandatory for newborns with risk factors for developing DDH [8]. The Ortolani and Barlow tests are the key for the screening of DDH among babies <3 months of age. Both tests mainly detect only the hip instability which necessitates further evaluation [9]. The Galeazzi sign will be of higher importance in the older child examination for DDH [10]. In doubtful cases, ultrasound is the imaging tool of choice in infants up to five months. It can visualize the hip abnormalities as the subluxated or dislocated femoral head, abnormal alpha angle, abnormal thickness of labrum, presence of pulvinar, or ossific centers asymmetry [11], while pelvic X-rays are more useful in ages more than 5 months [12].

Data regarding the prevalence and incidence of DDH in Saudi Arabia are still unclear. Hence this study was conducted to evaluate the incidence of DDH in Arar City, The capital of Northern Border principality, Saudi Arabia from January 2013 to the end of December 2013 in Arar Central Hospital and Prince Abdulaziz bin Musaad Hospital.

Material and Methods

The current study design was approved by the Institutional Research Board (IRB) of King Fahd Medical City. Ethical issues and confidentiality were considered in all the steps of the research project.

The present study is a retrospective study ofhospital records from both Arar Central Hospital and Prince Abdulaziz bin Musaad Hospital (The only hospitals which have obstetricians with available delivery rooms service in Arar) for all newborn infants from January 2013 to the end of December 2013. The study includes their follow-up files till December 2015.

The complete history including prenatal, natal, and postnatal history details of the enrolled babies were collected at the Delivery room. A meticulous physical examination of the newborn was conducted. Then the laboratory and radiological investigations were requested accordingly.

Ultrasonography was requested for infants below 6 months of age with suggestive signs for DDH such as Ortolani, Barlow signs, or limited abduction of the hips; while X-ray was requested in cases aged above 6 months with suggestive clinical examination data for DDH. In addition, Ultrasonography was routinely requested for babies with suggestive risk factors for DDH during the first 2 months after birth regardless of their examination data. The risk factors considered in the study were a positive family history of DDH, multiparous mother, prenatal history of oligohydramnios or breech presentation. In addition, orthopedic anomalies and swaddling were considered as risk factors of DDH among the enrolled babies.

All data regarding the babies' history, examination, and investigations were collected for further statistical analysis. Babies with findings suggestive for DDH were referred to an orthopedic surgeon for the final decision and management planes. All infants enrolled in the study were being followed until walking age to detect any case which might be undiagnosed with the early evaluation.

Statistical analysis: The Chi-Square test was used to study the effect of different risk factors on the appearance of DDH among the studied population. Graph pad Prism 5 (GraphPad Software Inc., San Diego, CA) software was used to perform the statistical analysis. Significance was considered with p-value<0.05.

Results

Among 2582 newborns, only 16 cases were diagnosed as DDH with an estimated incidence rate of 6.19/1000 live births. The data of diagnosed cases regarding the affected side, gender, mother ages and parity, gestational ages, birth weight and type of delivery are shown in Table 1.

The male to female ratio among the diagnosed cases was 1:2.6. Bilateral DDH was found in 3 cases (18.75%), Unilateral cases were more common in the right hip joint [in 7 cases (43.75%)]. Eleven cases (68.75%) were delivered through normal vaginal delivery. After walking, limping was the most common finding in the diagnosed cases [10 cases (62.5%)].

Statistical analysis showed a significant association between the development of DDH with primiparity, low birth weight, prematurity and positive family history of DDH (p-values=0.0009, 0.014, 0.038, and 0.0006 respectively) Ttable 2).

Table 1. Data of cases diagnosed as developmental dysplasia of the hip joints among the studied population.

Cases	Effect side	Mother age (y)	Gender	GA (weeks)	Parity	BW (Kg)	Type of delivery	FH
Case 1	right	32	Female	36	Multipara	<2.5	SVD	Positive
Case 2	Left	31	Female	35	Multipara	<2.5	SVD	Positive
Case 3	Left	29	Male	35	Primi	<2.5	CS	Negative
Case 4	Right	20	Male	39	Primi	>2.5	CS	Negative
Case 5	Left	20	Female	40	Primi	>2.5	CS	Negative
Case 6	Left	24	Female	37	Primi	>2.5	CS	Negative
Case 7	Left	23	Male	39	Primi	>2.5	SVD	Negative
Case 8	Left	33	Female	40	Multipara	>2.5	SVD	Negative
Case 9	Bilateral	25	Male	39	Primi	>2.5	SVD	Negative
Case 10	Right	20	Female	40	Primi	>2.5	CS	Negative
Case 11	Bilateral	19	Female	40	Primi	<2.5	SVD	Positive
Case 12	Right	38	Female	39	Multipara	>2.5	SVD	Negative
Case 13	Right	21	Male	40	Primi	>2.5	SVD	Positive
Case 14	Right	40	Female	39	Multipara	>2.5	SVD	Negative
Case 15	Bilateral	26	Female	31	Primi	<2.5	SVD	Positive
Case 16	Right	29	Male	37	Multipara	>2.5	SVD	Negative

CS: Caesarean section; GA: Gestational age; SVD: Spontaneous vaginal delivery

Table 2. The effect of gender, parity, delivery method, breech presentation, birth weight, gestational ages of the newborn and family history on the incidence of developmental dysplasia of the hip (DDH) among the studied population.

Gender	Female	Male	Total	P-value
No DDH	1429	1137	2566	0.7685
With DDH	10	6	16	
Total	1439	1143	2582	
Parity	Primiparous	Multiparous	Total	P-value
No DDH	613	1953	2566	0.0009***
With DDH	10	6	16	
Total	623	1959	2582	
Delivery	SVD	CS	Total	P-value
No DDH	1625	941	2566	0.848
With DDH	10	6	16	
Total	1635	947	2582	
Presentation	Breech	Non breech	Total	P-value
No DDH	118	2450	2568	0.7769
With DDH	1	15	16	
Total	119	2465	2584	
Birth weight	<2.5	³ 2.5	Total	P-value
No DDH	251	2315	2566	0.014*
With DDH	5	11	16	
Total	256	2326	2582	
Gestational age	<37	³ 37	Total	P-value
No DDH	201	2365	2566	0.0386*
With DDH	4	12	16	
Total	205	2377	2582	
Family history	Positive	Negative	Total	P-value
No DDH	168	2398	2566	0.0006***
With DDH	5	11	16	
Total	173	2409	2582	

Abbreviations:
DDH: Developmental dysplasia of the hip; CS: caesarian section; SVD: Spontaneous vaginal delivery

Discussion

The current study was conducted to study the incidence and risk factors of neonatal developmental dysplasia of the hip in Arar City among newborns delivered during 2013. The records of 2582 newborns were reviewed. Sixteen cases were diagnosed as DDH in 2013 with an estimated incidence of 6.19/1000 live births. Ten cases (62.5 %) were females and 6 cases (37.5) were males (M: F ratio - 1:2.6). Bilateral DDH was found in 3 cases (18.75%); unilateral cases were more common in the right hip joint [in 7 cases (43.75%)]. Eleven cases (68.75%) were delivered through normal vaginal delivery. Five cases (31.255) were weighted blow 2.5 kilograms while four (25%) cases were delivered before the 37th week of gestation. DDH was significantly associated with primiparity, low birth weight, prematurity and positive family history of DDH (p-values=0.0009, 0.014, 0.038, and 0.0006 respectively).

The current study has estimated the incidence of DDH to be 6.19/1000 live births. The incidence of DDH is highly variable in different publications. The racial factor was shown to have a role in this variation; for example, Native Americans and Laplanders have a higher frequency of DDH (nearly up to 50 cases per 1000 persons), while its frequency is very low among black populations and southern Chinese [13-15].

The current data revealed a significant association of DDH with a family history of previous cases of DDH, primiparity, low birth weight, and prematurity. Our data is in accordance with previously published data. Positive family history of DDH among parents was reported to increase the risk 10 times among their babies in comparison to the others [16]. Chan et al. (1997) [17] reported a significant association between DDH and prematurity, primiparity and low birth weight. However, our finding is in discordance with Sezer et al. (2013) [18] who reported that prematurity had no effect on DDH. In addition, the current study showed that the gender, mode of delivery, the breech presentation showed no effect on the incidence of DDH, which is also not in line with the previously published data (8, 19, 20, 21,22). Also, DDH was more commonly reported in the left side (23), which is different from our data which find more prevalence in the right side hip joints among the studied cases. This discrepancy in the published data related to the risk factors of DDH is mainly due to the multifactorial etiology of the problem. Thus some factors can predominate more than the others in the different study populations.

The current data showed that risk factors for DDH are not the same in the different studiedpopulation which may be mainly due to the multifactorial origin of the problem. Also, the study highlights the importance of the routine screening programs in diagnosis of the cases of DDH among newborns as all cases were detected with the initial screening without newly diagnosed cases in the follow-up. This early diagnosis is expected to improve the early family counseling about the disease which can help for better management planning.

Conclusion

Screening of DDH in Arar City of Northern Border province of Saudi Arabia was estimated to be 6.19/ 1000 live births. Awareness programs, routine examination of the neonatal hip joint using hip ultrasound and pelvis plain x-ray after the age of 3 months in babies with risk factors for DDH are strongly recommended.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

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Conflict of interest
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